

CLAIMS

1. A separator comprising a microporous layer, wherein said separator is prepared according to a method comprising the steps of:
  - 5 (a) coating a microporous layer on a temporary carrier substrate to form a microporous layer assembly, wherein said microporous layer has a first surface in contact with said temporary carrier substrate and has a second surface on the side opposite from said temporary carrier substrate;
  - (b) coating an overlying layer on said second surface of said microporous layer, wherein said overlying layer has a first surface in contact with said second surface of said microporous layer and has a second surface on the side opposite from said microporous layer; and
  - (c) removing said temporary carrier substrate from said first surface of said microporous layer to form said separator;
- 10 wherein said microporous layer comprises one or more microporous xerogel layers and wherein at least one of the one or more microporous xerogel layers comprises a zirconium oxide xerogel material.
2. The separator of claim 1, wherein said microporous layer further comprises an organic polymer binder.
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3. The separator of claim 2, wherein said organic polymer binder is a polyvinyl alcohol.
4. The separator of claim 2, wherein said microporous layer further comprises a plasticizer component.
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5. The separator of claim 1, wherein the thickness of said separator is from 1 to 25 microns.

6. The separator of claim 1, wherein the thickness of said separator is from 5 to 15 microns.
  7. A separator for use in an electrochemical cell, wherein said separator comprises a microporous xerogel layer, which xerogel layer comprises zirconium oxide.
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8. The separator of claim 7, wherein said microporous layer further comprises an organic polymer binder.
  9. The separator of claim 8, wherein said organic binder is polyvinyl alcohol.
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10. The separator of claim 8, wherein said microporous layer further comprises a plasticizer component.
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11. The separator of claim 7, wherein the thickness of said separator is from 1 to 25 microns.
  12. The separator of claim 7, wherein the thickness of said separator is from 5 to 15 microns.
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13. An electrochemical cell comprising a cathode, an anode and a separator comprising a microporous layer interposed between said cathode and said anode, wherein said separator is prepared according to a method comprising the steps of:
    - (a) coating a microporous layer on a temporary carrier substrate to form a microporous layer assembly, wherein said microporous layer has a first surface in contact with said temporary carrier substrate and has a second surface on the side opposite from said temporary carrier substrate;
    - (b) coating an overlying layer on said second surface of said microporous layer, wherein said overlying layer has a first surface in contact with said second surface of said microporous layer and has a second surface on the side opposite from said microporous layer; and
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- (c) removing said temporary carrier substrate from said first surface of said microporous layer to form said separator;  
wherein said microporous layer comprises one or more microporous xerogel layers and wherein at least one of the one or more microporous xerogel layers comprises a zirconium oxide xerogel material.
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14. The cell of claim 13, wherein said microporous layer further comprises an organic polymer binder.
- 10 15. The cell of claim 14, wherein said organic polymer binder is a polyvinyl alcohol.
16. The cell of claim 14, wherein said microporous layer further comprises a plasticizer component.
- 15 17. The cell of claim 13, wherein said cell is a secondary electrochemical cell.
18. The cell of claim 13, wherein said cell is a primary electrochemical cell.
19. An electrochemical cell comprising a cathode, an anode, and a separator interposed  
20 between said cathode and said anode, wherein said separator comprises a microporous xerogel layer, which xerogel layer comprises zirconium oxide.
20. The cell of claim 19, wherein said microporous layer further comprises an organic polymer binder.
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21. The cell of claim 20, wherein said organic polymer binder is a polyvinyl alcohol.
22. The cell of claim 20, wherein said microporous layer further comprises a plasticizer component.

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23. The cell of claim 19, wherein said cell is a secondary electrochemical cell.

24. The cell of claim 19, wherein said cell is a primary electrochemical cell.

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